# 6.0 PRODUCT RECEIPT, STORAGE, AND DISPOSAL

The ILAW will be disposed of directly by near-surface land disposal in dedicated facilities. IHLW will be stored on site until it can be shipped to the geologic HLW repository at Yucca Mountain, Nevada.

BNFL Inc. currently plans to provide in-plant storage space for up to 45 IHLW canisters and 450 ILAW packages. During operation of the BNFL Inc. facilities, the inventory of the in-plant storage areas are assumed to be at 50 percent of capacity.(PIO 2000) The Case 3S6E scenario indicates that the LAW vitrification plant will reach 50 percent of its in-plant storage capacity on August 13, 2007. The project baseline date for the first shipment date is December 2007. The scenario indicates that the inventory of in-plant stored ILAW packages would reach 72 percent of the in-plant storage space if shipping does not begin until December 2007. For IHLW, the 3S6E scenario indicates that the HLW vitrification plant will reach 50 percent of its in-plant storage capacity on April 2, 2009. The project baseline date for the first shipment date is September 2009. The scenario indicates that the inventory of in-plant stored IHLW canisters would occupy 91 percent of the in-plant storage space if shipping does not begin until September 2009.

The regulatory status of the BNFL Inc. in-plant storage areas for ILAW packages and IHLW canisters is not know. BNFL Inc. has indicated during informal discussion that they do not expect to be subject to the dangerous waste ninety day storage limits on these areas.

The current CHG storage and disposal project baselines are based on Phase 1 maximum order quantities of 13,336 ILAW packages and 1,120 IHLW canisters (Cusack 2000). These limits have not been imposed on the cases modeled by this report. The Case 3S6E scenario indicates that 13,500 ILAW packages and 1,070 IHLW canisters would be filled by the end of the Phase 1 contract period.

## 6.1 IMMOBILIZED LOW-ACTIVITY WASTE DISPOSAL

The ILAW packages will be disposed of in the ILAW Disposal Facility, Project W-520. The ILAW Disposal Facility consists of a series of modules to be constructed on an as-needed basis.

### 6.1.1 Immobilized Low-Activity Waste Package and Disposal Facility Design

BNFL Inc. will deliver the ILAW product in 1.22-m diameter by 2.28-m tall right cylindrical packages. The sidewall of each container is 0.343-cm (10-gauge) steel. All packages are disposed of as remote-handled waste in near-surface disposal modules. Project W-520 is being rebaselined to a remote-handled trench concept (Taylor 1999b). Each trench (or module) will hold 13,366 packages. The remote-handled trench concept applies the operating concepts in use in the solid-waste disposal grounds. This concept uses portable shielding and earth covers to protect workers from radiation. A shielded transfer bell and crane are used to move the ILAW package from the truck to the trench.

Figures 6.1-1, 6.1-2, and 6.1-3 show the operating concept, the module design, and the site layout. These figures are updated versions of the figures shown in Boston (1999b). The first near surface disposal module is scheduled to be turned over to Operations on September 1, 2007, and will begin receiving ILAW packages in December 2007.

Assumptions concerning package contents are provided in Appendix A, Section 7.19. Based on the assumption that the packages are filled to 90 percent of the 2.51 $m^3$ internal volume, each package will hold 2.23 $m^3$ of glass. Based on a density of 2.66 MT/$m^3$, each package would hold 6.0 MT of glass. The BNFL Inc. planned in-plant storage capacity for ILAW packages is 450. It is assumed that BNFL Inc. will operate the storage area at 50 percent of capacity (PIO 2000). For Phase 1 ILAW package delivery dates are based on the assumption that packages will be shipped when more than 225 packages are in in-plant storage. For Phase 2, the in-plant storage capacity is assumed to be 1,800 positions (90-day storage at 100 percent TOE). The Phase 2 ILAW package delivery dates are based on the assumption that packages will be shipped when more than 900 packages are in-plant storage.

### 6.1.2 Immobilized Low-Activity Waste Receipt and Disposal Schedules

The Case 3S6E scenario indicates that the initial Phase 1 ILAW package is filled on December 1, 2006. The BNFL Inc. in-plant storage reaches 50 percent of capacity on August 13, 2007. Case 3S6E predicts that BNFL Inc. will run out of in-plant storage space on January 18, 2008, if ILAW packages are not shipped. The project baseline assumes that shipping of ILAW package will start in December 2007. During Phase 1, the shipment of ILAW packages is consistent with production equivalent to the Case 3S6E assumptions for ramp-up of LAW treatment. During Phase 1, the nominal ILAW package receipt rate is ramped up to approximately 1,270 packages per year.

Phase 1 – Contract Minimum Order Quantities

The contract minimum order quantity for Phase 1 is LAW is 6,000 units of Na processed. The HTWOS model predicts that with the Case 3S6E scenario, the minimum order quantity of LAW makes approximately 6,930 ILAW packages. The last package from the minimum order quantity is filled on June 13, 2013 and is delivered August 17, 2013. The ILAW receipt schedule that corresponds to the minimum quantity order is shown in Figure 6.1-4.

Phase 1 – Contract Completion Period

The Phase 1 contract is completed on February 28, 2018. The Case 3S6E scenario indicates that approximately 12,600 ILAW packages would be produced from the waste in the Phase 1 extended order tanks by this date. Figure 6.1-5 shows the number of ILAW packages received each calendar year by the Project W-520 ILAW disposal facilities.

Figure 6.1-1. Project W-520 Immobilized Low-Activity Waste Disposal Site Operating Concept.

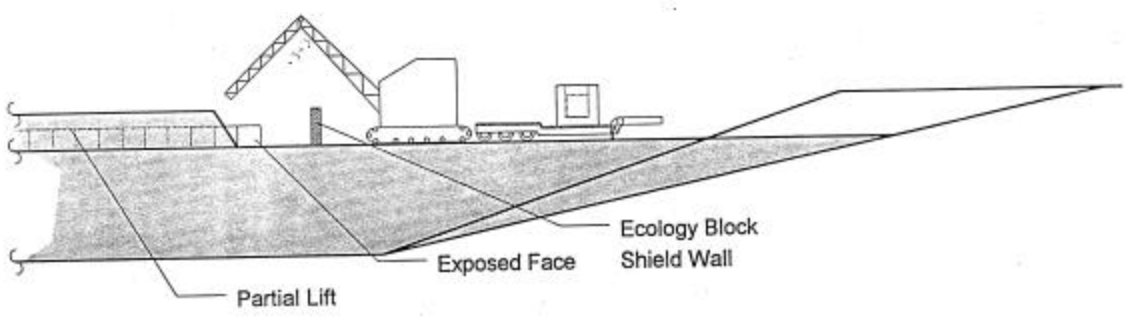
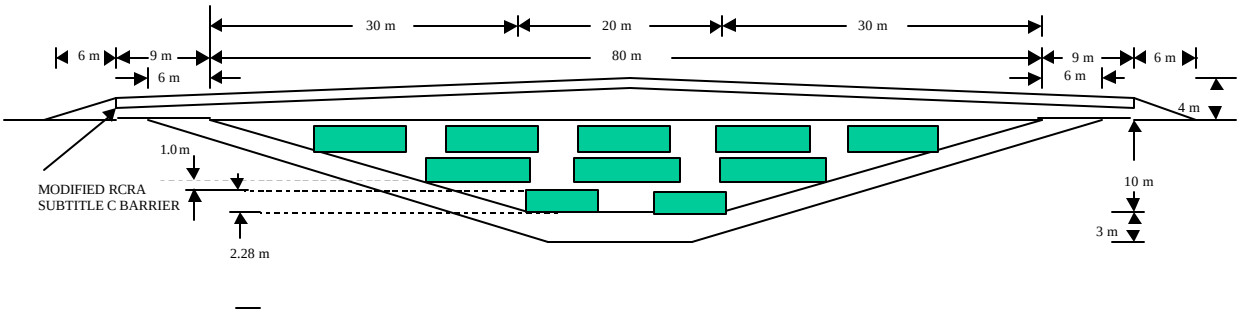



Figure 6.1-2. Project W-520 Immobilized Low-Activity Waste Disposal Site Construction Concept.



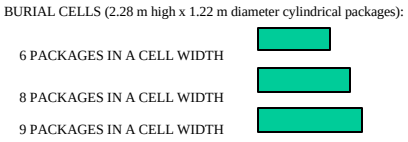



Figure 6.1-3. Project W-520 Immobilized Low-Activity Waste Disposal Site Layout.

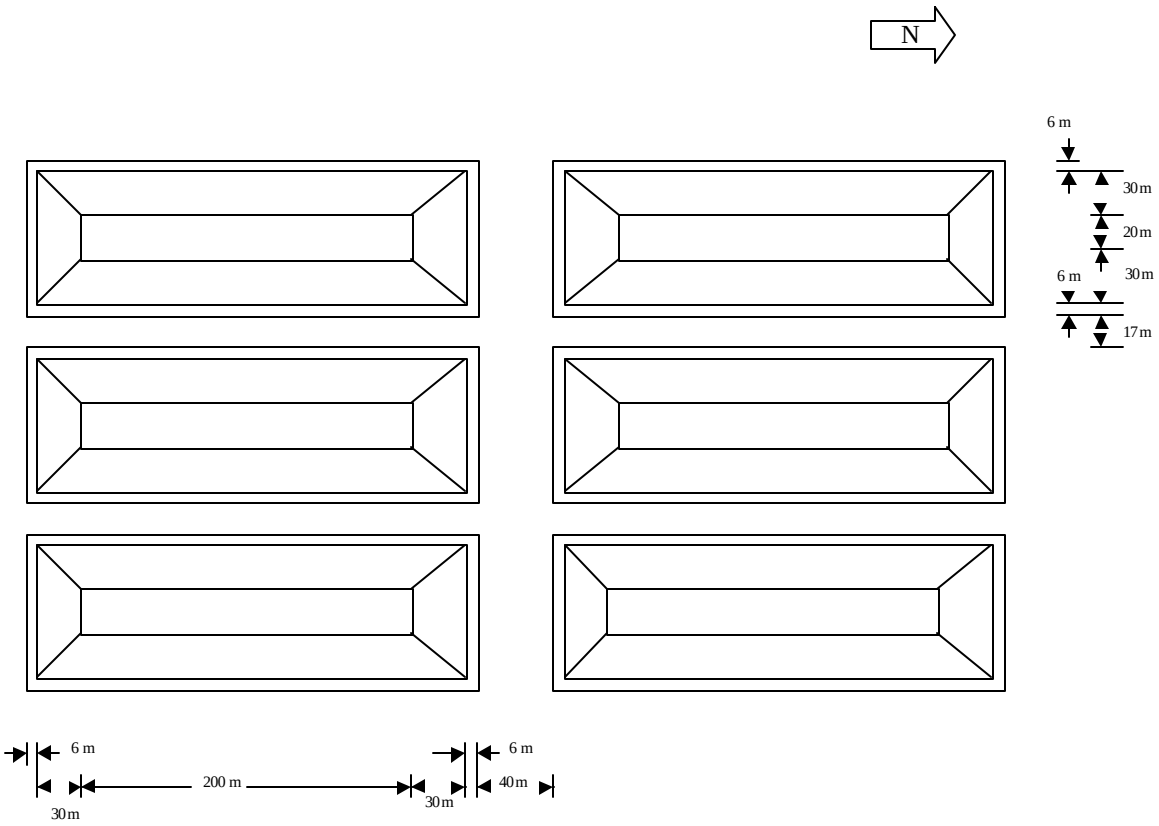


Figure 6.1-4. Case 3S6E Phase 1 Contract Minimum Order Quantity.
Immobilized Low-Activity Waste Receipt Schedule.

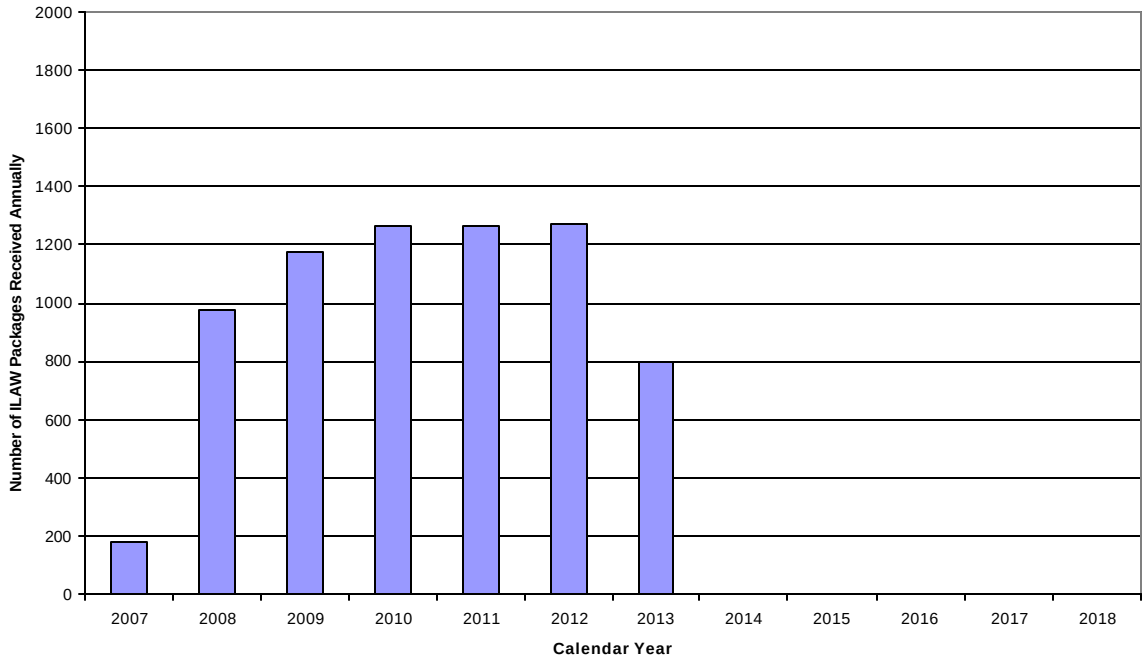
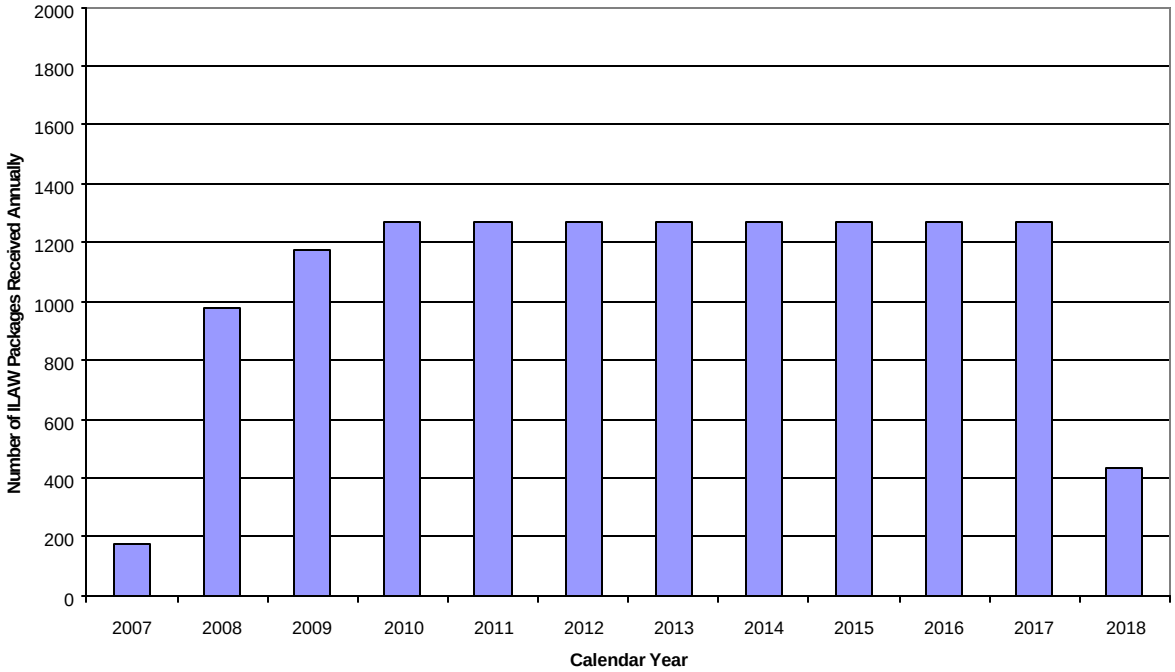



Figure 6.1-5. Case 3S6E Phase 1 Contract Completion Period.
Immobilized Low-Activity Waste Receipt Schedule.



Phase 1 – Extended Order Tanks

The tanks identified for the extended order quantity would allow processing after the February 28, 2018, date. The Case 3S6E scenario indicates that approximately 14,300 ILAW packages would be produced from the waste in the extended order tanks. The final Phase 1 ILAW package from the extended order is filled October 13, 2018, and is shipped December 28, 2018. Figure 6.1-6 shows the number of packages received each calendar year from the extended order tanks.

Total Phase 1 and Phase 2 Mission

Case 3S6E generates from the Phase 1 and Phase 2 approximately 64,100 ILAW packages. Figure 6.1-7 shows the number of packages received each calendar year for the total mission. Figure 6.1-8 shows the number of ILAW packages in the disposal site at the end of each calendar year. To assure that Phase 2 HLW vitrification could be started up at an increased process rate on March 1, 2018, it was necessary to assume that Phase 2 waste separations and LAW vitrification started before that date. This assumption is discussed in detail in Appendix A. Thus the first Phase 2 ILAW package is filled September 2, 2017, and is shipped October 5, 2017. However, the final Phase 1 ILAW package from the extended order is not filled October 13, 2018. In the combined Phase 1 and Phase 2 processing 13,500 ILAW packages are filled by the end of the Phase 1 contract period. This is 900 more ILAW packages than are produced by the end of the Phase 1 contract period from Phase 1 extended order tank waste only.

Several production outages, and operation past 2030, caused by a lack of feed are evident in Phase 2. In Phase 2 the ILAW package shipments are, on the average, approximately 80 percent of that expected for LAW vitrification facilities sized to manufacture 120 MT/d glass. In Phase 2, at 120 MT/d glass and 60 percent TOE equivalent, the ILAW package shipment rate would be about 4,380 packages per year for a 20 wt% $Na_2O$ glass. However, HTWOS predicts that in Phase 2 of Case 3S6E, the ILAW shipment rate will vary from 2,800 to 4,380 packages per year. This shortage of LAW feed is due to bottlenecking of the overall flowsheet by the HLW vitrification facility. Increasing the capacity of the HLW vitrification facility is evaluated in Section 6.3.

Figure 6.1-9 provides an order-of-magnitude comparison of the surface dose rate for ILAW packages from each feed batch. The dose rate is specific to a glass waste form inside a container with 0.343 cm steel walls. The limitations of the shielding analysis methodology are discussed in Appendix G. The total dose rate estimates are based on the contributory dose of 10 key radionuclides. Only the total dose and the dose from the three largest contributors, $^{137}Cs$, $^{134}Cs$, and $^{154}Eu$, are shown in the figure. The dose rates are plotted against the shipping date of the first canister from each batch. This assumption is being reviewed. The characteristics and key radionuclide inventories for each batch are compiled in Appendix G. The two large peaks in the $^{154}Eu$ dose and total dose values are not entirely understood at this time. Europium is not generally expected to partition to liquid phases and thus is not normally found in large quantities in the ILAW feed. The peak in 2011 is from waste in tank 241-AN-107 and may be caused by a conservative solids dissolution assumption by the HTWOS model. The cause for the cluster of high dose rate values that occur in 2030 is from inactive miscellaneous storage tank waste and

Figure 6.1-6. Case 3S6E Phase 1 Extended Order Tanks.
Immobilized Low-Activity Waste Receipt Schedule.

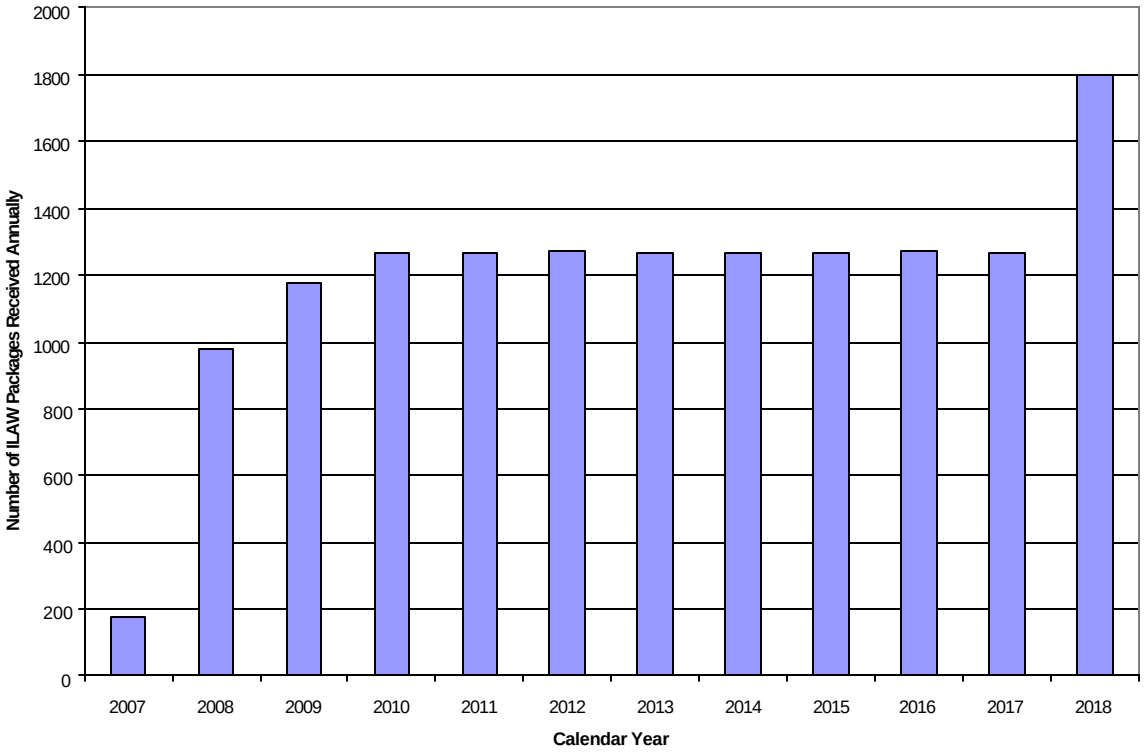



Figure 6.1-7. Case 3S6E Total Phase 1 and Phase 2 Mission.
Immobilized Low-Activity Waste Receipt Schedule.

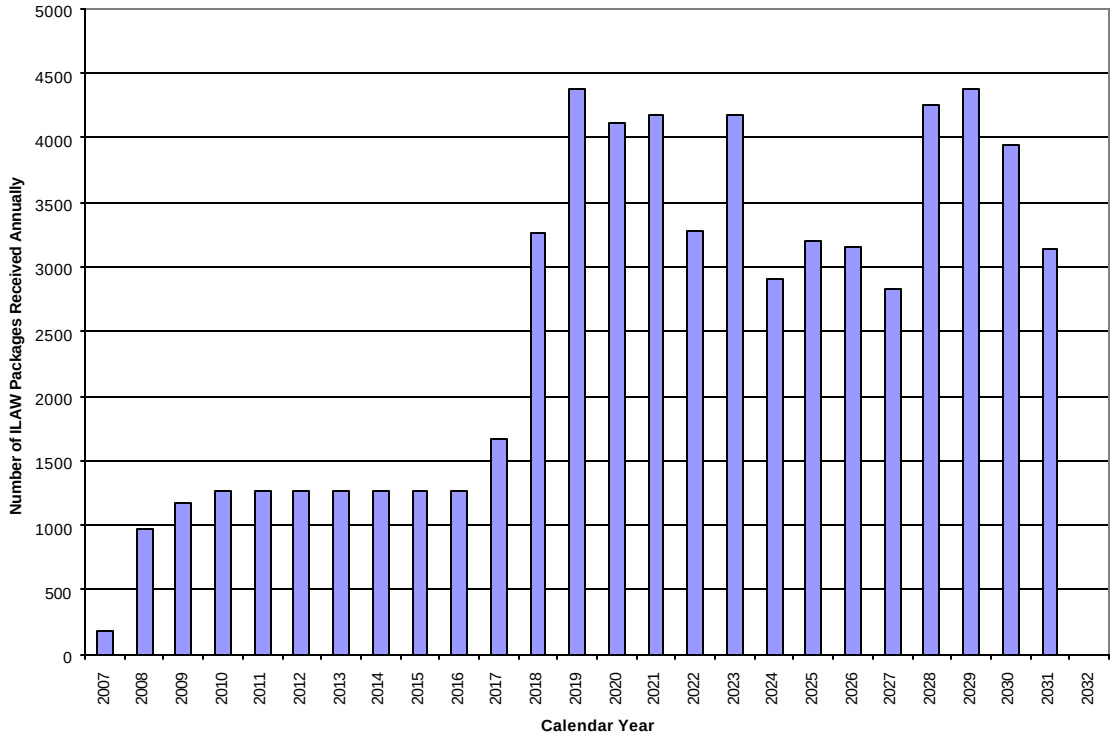


Figure 6.1-8. Case 3S6E Total Phase 1 and Phase 2 Mission.
Immobilized Low-Activity Waste Packages in Storage.

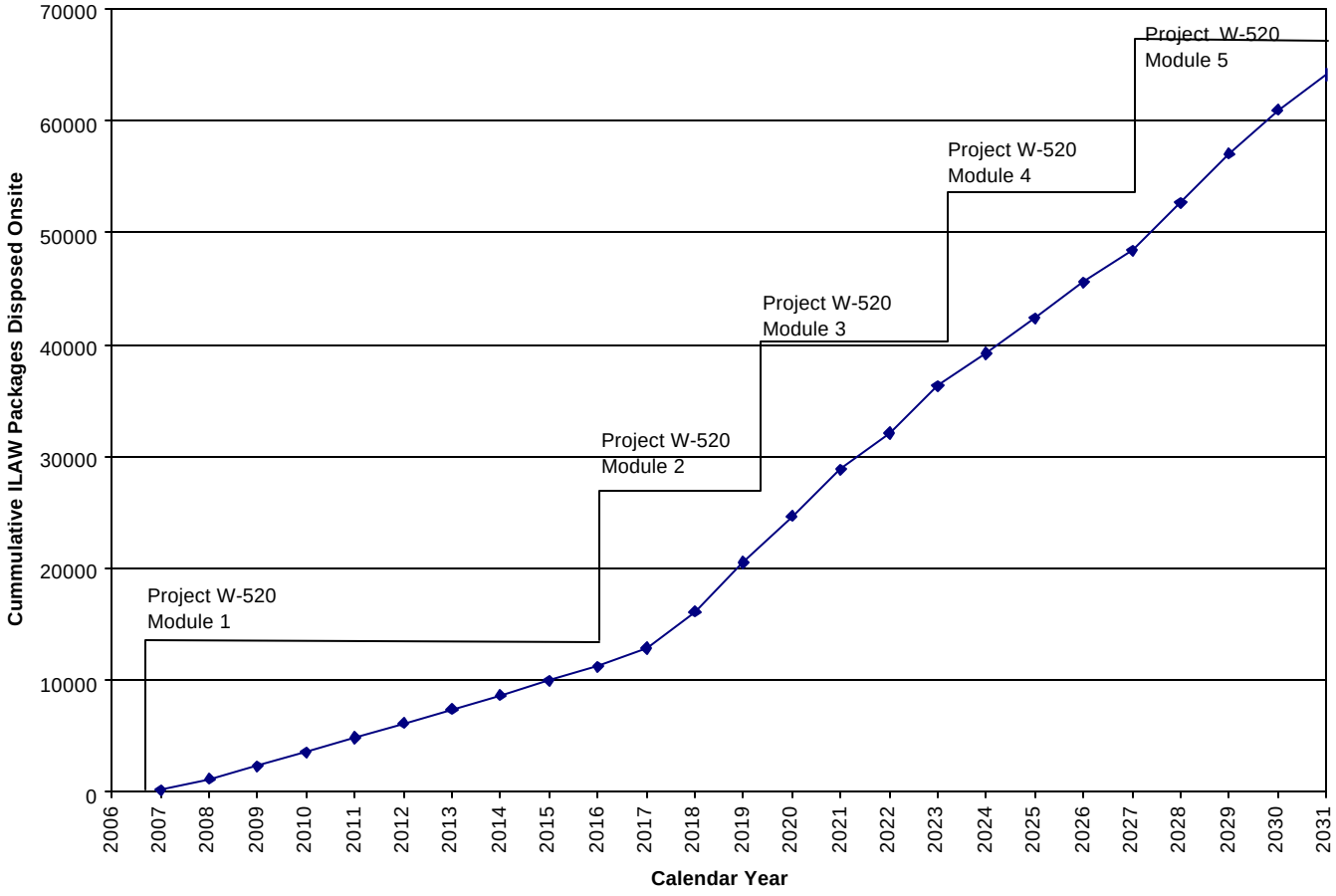
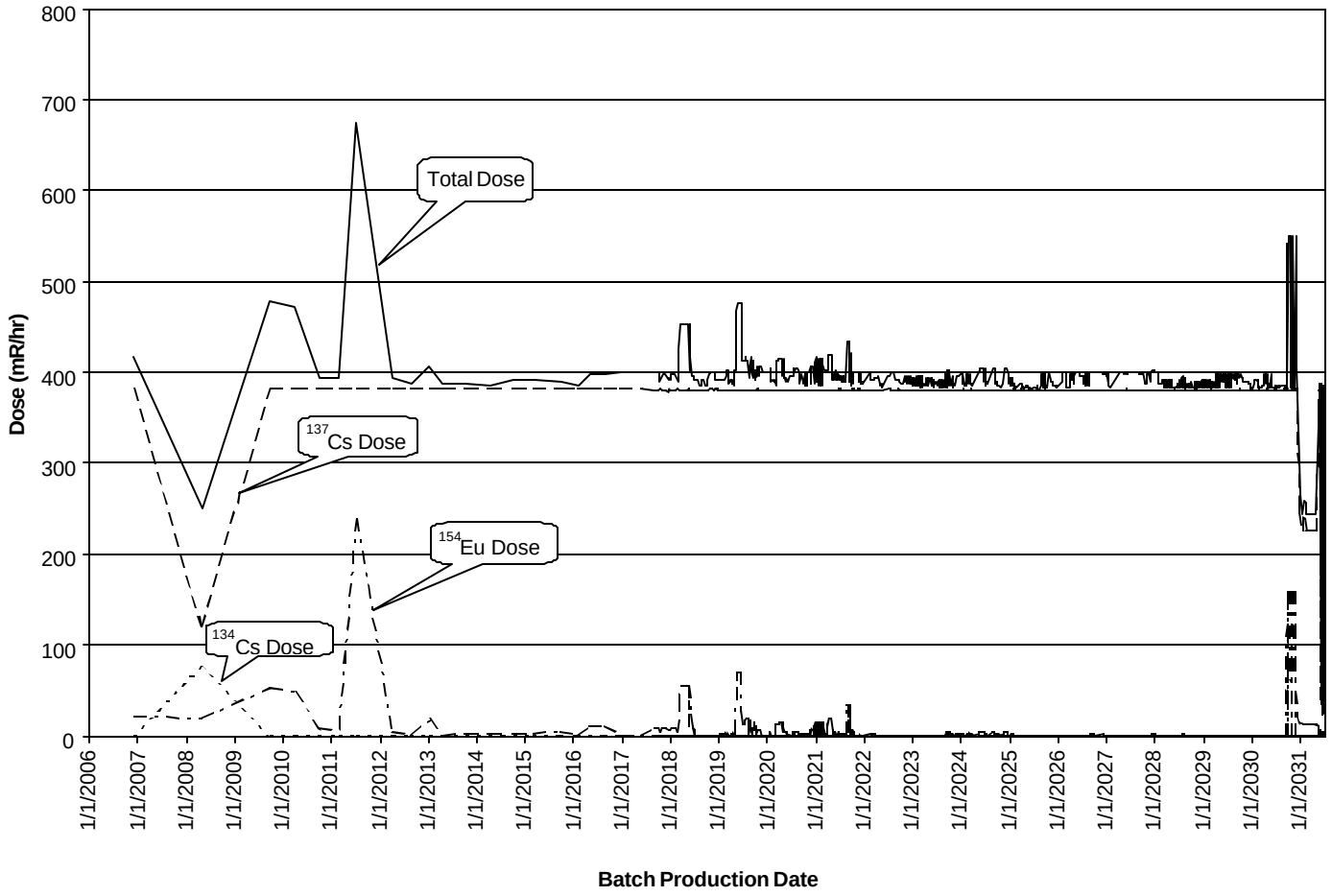


Figure 6.1-9. Case 3S6E Total Phase 1 and Phase 2 Mission.
Total and Contributing Surface Dose Rates from Immobilized Low-Activity Waste Packages. (Packages with 0.343 cm Steel Side Walls)



may be caused by an error in interpretation of the original data. Both peaks are being investigated at this time.

Specification 2 of the contract requires that BNFL Inc. maintain the running average concentration of $^{137}Cs$ and $^{90}Sr$ in the ILAW product at less than 3 Ci/m$^3$ and 20 Ci/m$^3$ respectively. Individual packages may exceed these limits if the running average requirement is met. The separation requirements for Phase 2 are currently unknown. It is assumed Phase 1 separations requirements are applicable to Phase 2 for the purpose of modelng. The HTWOS model, on which Figure 6.1-6 is based, assumes that whenever possible the $^{137}Cs$ and $^{90}Sr$ concentrations in the ILAW glass are at, but not in excess of, the 3 Ci/m$^3$ and 20 Ci/m$^3$. The possibility that the $^{137}Cs$ and $^{90}Sr$ concentrations oscillate above and below the average limits is not modeled and thus is not indicated by the figure.

## 6.2 IMMOBILIZED HIGH-LEVEL WASTE STORAGE

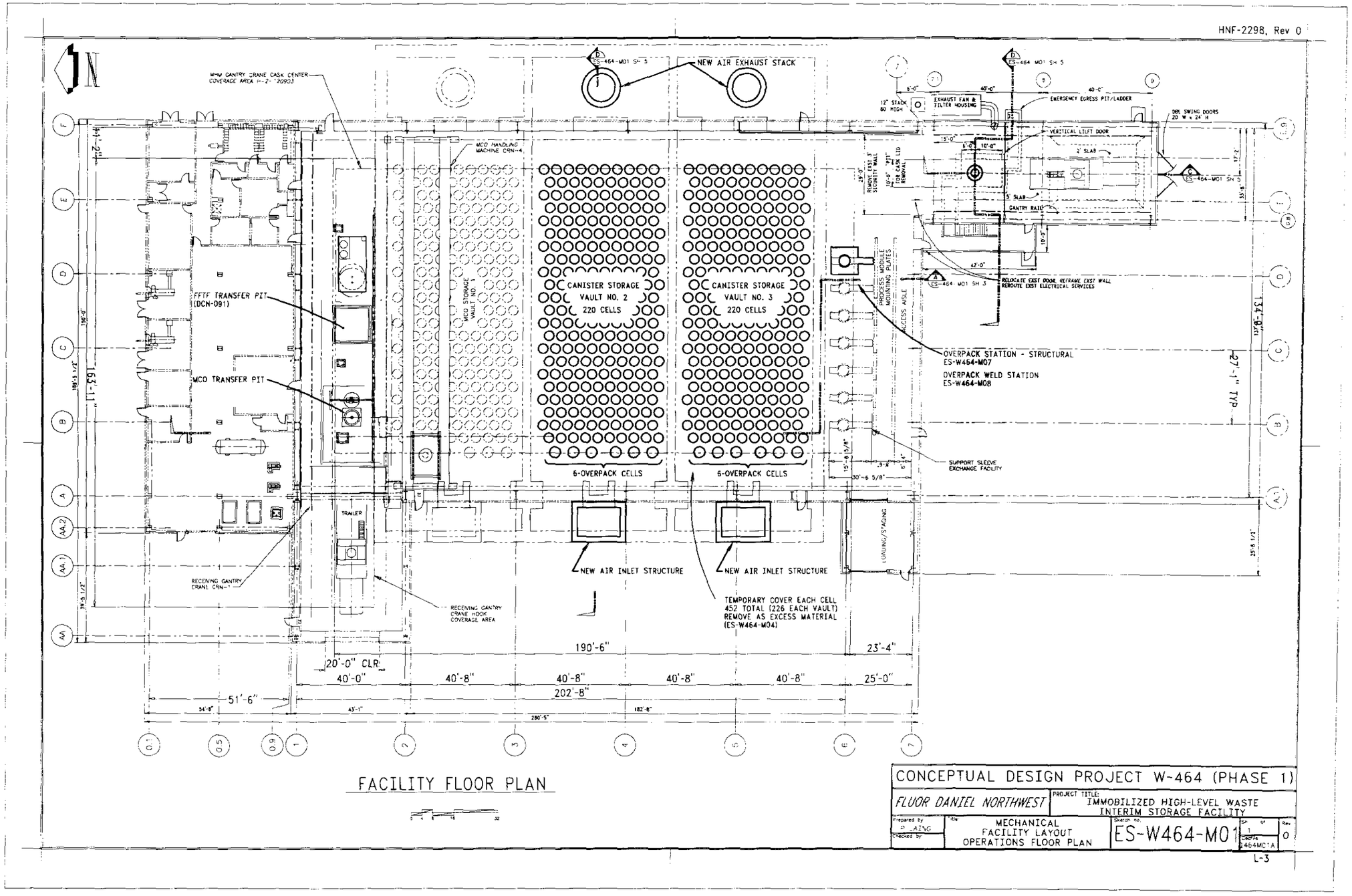
The IHLW canisters will be stored in the Canister Storage Building (CSB) under Project W-464. Additional IHLW interim storage for extended-order quantities in excess of the CSB capacity (i.e., 880 canisters) and the Phase 2 order quantity will be provided by new construction.

### 6.2.1 Immobilized High-Level Waste Canister and Storage Facility Design

BNFL Inc. will deliver the IHLW product in 0.61-m diameter by 4.5-m long right cylindrical canisters. The first canisters from Phase 1 processing are stored in the CSB. A plan view of the CSB is shown in Figure 6.2-1. The CSB consists of three storage vaults. One vault is committed for storage of K Basin spent fuel, and two vaults are committed to storage of IHLW. Project W-464 provides for transportation of the IHLW from BNFL Inc. to the CSB and for the CSB modifications necessary to store the IHLW canisters (Burgard 1998). Each vault contains 220 storage cells. A cell will hold two 4.5-m canisters for a total of 440 canisters per vault. Each vault also contains positions for six overpack cells that could hold two overpacked canisters each. Thus, the RPP has reserved space for 880 IHLW canisters and can accommodate an additional 24 IHLW canisters in overpack positions if needed. The CSB is scheduled to be turned over to Operations on September 1, 2008, and will begin receiving IHLW canisters September 2009. Plans are to construct additional CSBs. Each would have six vaults and hold 2,640 IHLW canisters (Project W-XXX). The Case 3S6E processing assumptions indicate a need for additional storage space for IHLW canisters by November 2016.

The nominal characteristics of the canister include a fill volume of 1.15 m$^3$ based on a 95 percent fill factor. Each canister will hold 3,060 kg of glass based on a glass density of 2.66 MT/m$^3$. The BNFL Inc. planned in-plant storage capacity for IHLW canisters is 45. It is assumed that BNFL Inc. will operate the storage area at 50 percent of capacity (PIO 2000). For Phase 1 the IHLW canister delivery dates are based on canisters being shipped when more than 23 canisters are in in-plant storage. For Phase 2, the in-plant storage capacity is assumed to be 350 positions (90 days storage at 100 percent TOE). The Phase 2 IHLW canister delivery dates are based on the assumption the canisters will be shipped when more than 175 canisters are in tank plan storage.

Figure 6.2-1. Project W-464 Canister Storage Building Plan View.



### 6.2.2 Immobilized High-Level Waste Receipt and Storage Schedules

The Case 3S6E scenario indicates that the first IHLW canister is filled on September 10, 2008. The BNFL Inc. in-plant storage space reaches 50 percent of capacity on April 2, 2009. Case 3S6E predicts that BNFL Inc. will run out of in-plant storage space on September 13, 2009 if IHLW canisters are not shipped. The project baseline assumes that IHLW canister receipt will start in September 2009. The CSB is filled to capacity (880 canisters) on October 26, 2016.

Phase 1 – Contract Minimum Order Quantities

The contract minimum order quantity for Phase 1 is HLW is 600 canisters. The HTWOS model predicts, that with the Case 3S6E scenario, the last canister from the minimum order quantity is filled on April 21, 2014 and is delivered June 30, 2014. The ILAW receipt schedule that corresponds to the minimum quantity order is shown in Figure 6.2-2.

Phase 1 – Contract Completion Period

The Phase 1 contract is completed on February 28, 2018. The Case 3S6E scenario indicates that approximately 1,070 IHLW canisters would be produced from the waste in the Phase 1 extended order tanks by this date. The CSB is filled to capacity (880 canisters) on October 26, 2016. Figure 6.2-3 shows the number of IHLW canisters received each calendar year from BNFL Inc.

Phase 1 – Extended Order Tanks

The tanks identified for the extended order quantity would allow processing after the February 28, 2018 date. The Case 3S6E scenario indicates that approximately 1,430 IHLW canisters would be produced from the waste in the extended order tanks. The final Phase 1 IHLW canister from the extended order is filled July 31, 2018, and is shipped October 31, 2018. Figure 6.2-4 shows the number of canisters received each calendar year from the extended order tanks.

Total Phase 1 and Phase 2 Mission

Case 3S6E generates from the Phase 1 and Phase 2 approximately 12,700 IHLW canisters. Figure 6.2-5 shows the number of canisters received each calendar year for the total mission. Figure 6.2-6 shows the number of IHLW canisters in storage at the end of each calendar year. Figure 6.2-6 also shows the effect on to onsite storage of shipping the IHLW canisters to the national geologic repository at Yucca Mountain, Nevada. Shipping is assumed to start October 1, 2034, and be completed in 10 years (Calmus 1999).

Figure 6.2-2. Case 3S6E Phase 1 Contract Minimum Order Quantity.
Immobilized High-Level Waste Receipt Schedule.

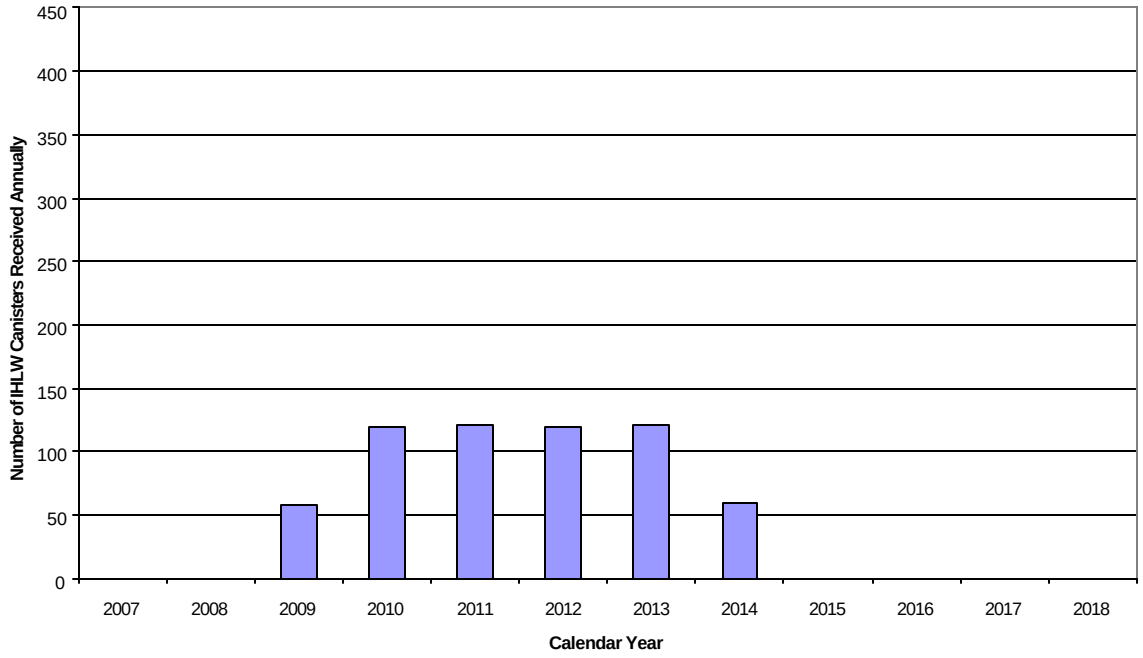



Figure 6.2-3. Case 3S6E Phase 1 Contract Completion Period.
Immobilized High-Level Waste Receipt Schedule.

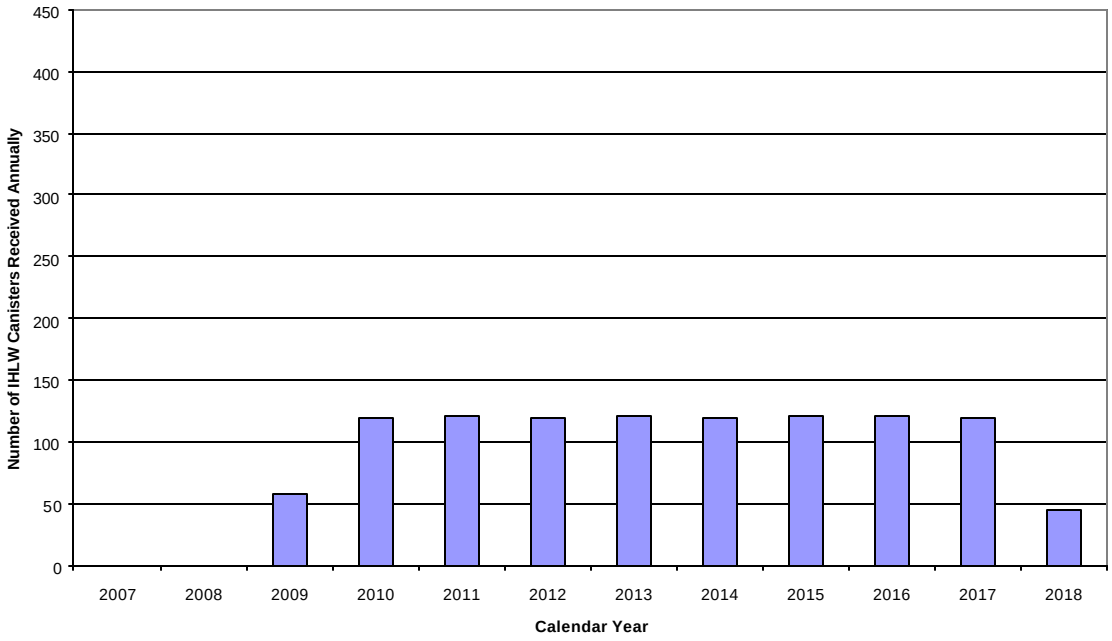


Figure 6.2-4. Case 3S6E Phase 1 Extended Order Tanks.
Immobilized High-Level Waste Receipt Schedule.

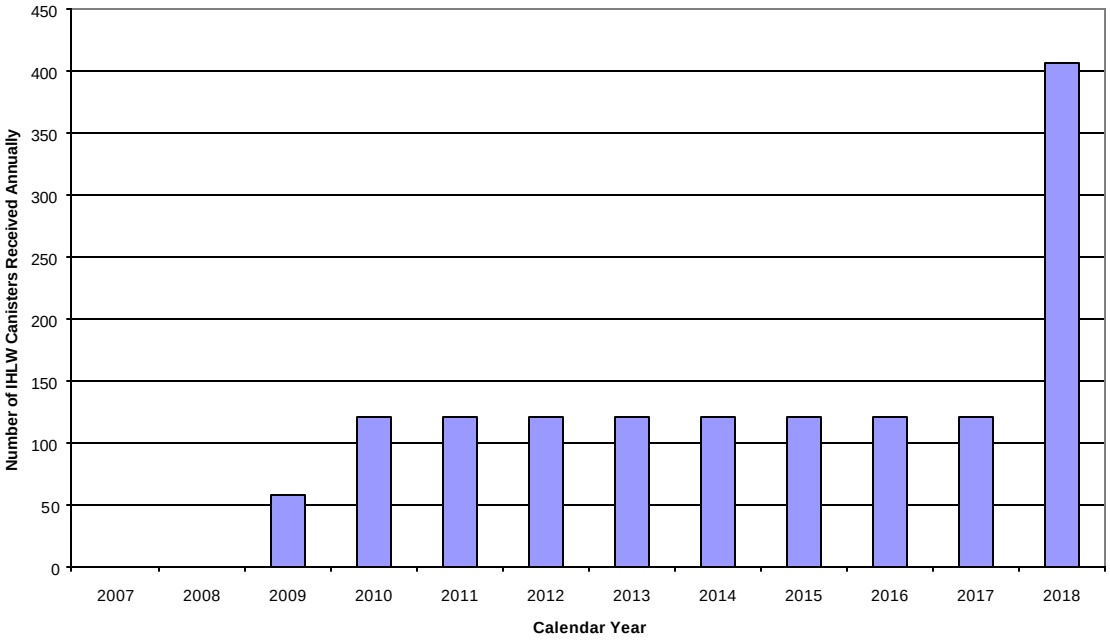



Figure 6.2-5. Case 3S6E Total Phase 1 and Phase 2 Mission.
Immobilized High-Level Waste Receipt Schedule.

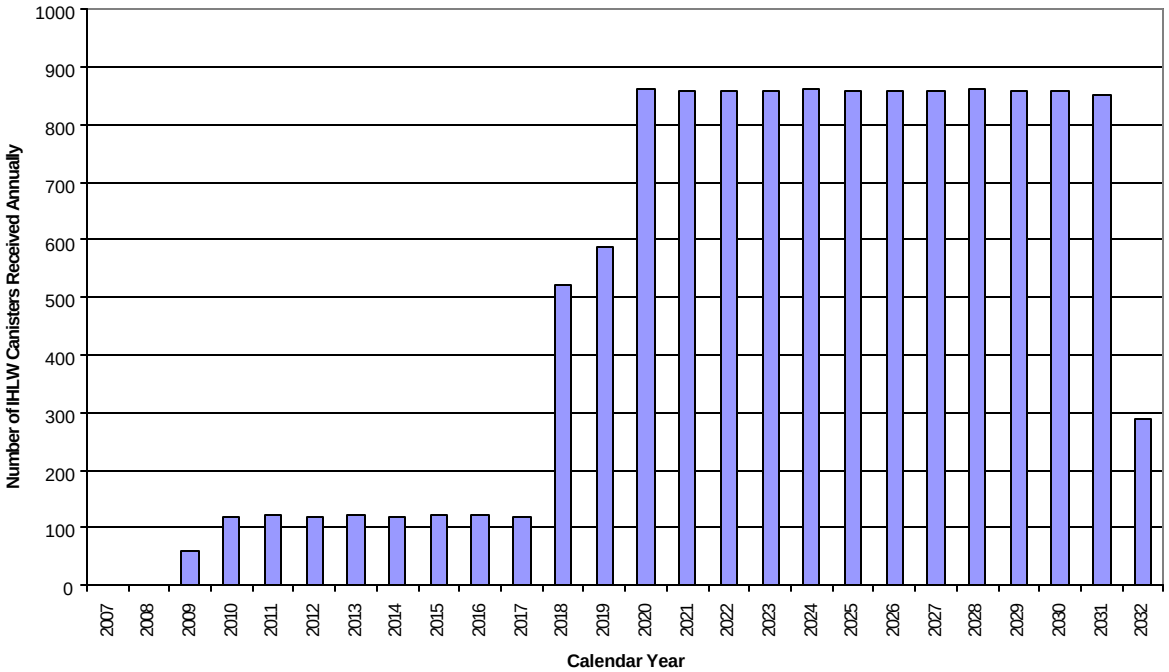


Figure 6.2-6. Case 3S6E Total Phase 1 and Phase 2 Mission.
Immobilized High-Level Waste Canisters in Storage.

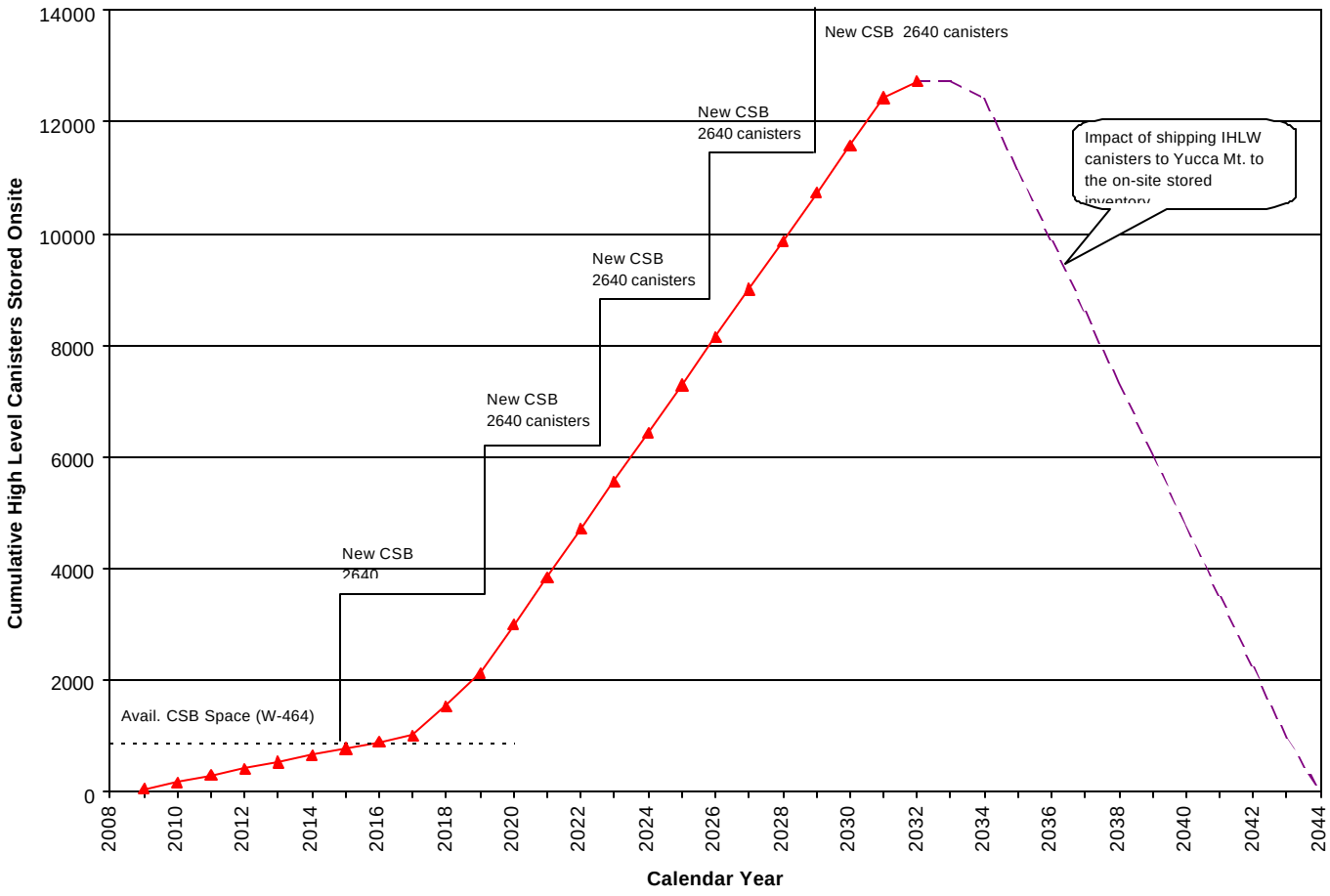


Figure 6.2-7 provides an estimate of the average IHLW canister decay heat for each feed batch. The decay heats are indexed to January 1 of the year the first canister in each batch is shipped and also to January 1, 2010. The maximum predicted heat load of an IHLW canister at the time it is received is 660 watts per canister. Figure 6.2-8 shows the radiolytic heat load, indexed to January 1, 2010, of the IHLW canisters in storage versus the shipment dates. Figure 6.2-9 shows the radiolytic heat load of IHLW canisters in storage, indexed to January 1, 2010, versus the number of canisters received. Appendix G includes a table that shows the number of IHLW canisters in each batch, the initial shipment date, the average decay heat load of each canister in a batch, and the cumulative thermal load of the canisters shipped.

## 6.3 SENSITIVITY RESULTS

**Case 3S6E R2A Evaluation of the PIO Guidance**

The Phase 2 LAW vitrification facility is significantly underutilized due to a process rate inbalance between the HLW and LAW vitrification plants. Product receipt schedules are provided in Appendix G.

Case 3S6E R2A predicts the generation of approximately 64,100 ILAW packages. However, only 13,500 ILAW packages are filled by the end of the Phase 1 contract period. The initial ILAW package is filled on December 1, 2006. The BNFL Inc in-plant storage reaches 50 percent of capacity on August 13, 2007. Case 3S6E R2A predicts that BNFL Inc. will run out of in-plant storage on January 18, 2008, if ILAW is not shipped to the ILAW Disposal Site. The maximum production rate of ILAW packages in Phase 1 is 1,270 packages/year. The peak annual production rate in Phase 2 is 4,380 packages/year. The final ILAW package is shipped in September 2031.

Case 3S6E R2A predicts the generation of approximately 12,700 IHLW canisters. However, only 1,070 IHLW canisters are filled by the end of the Phase 1 contract period. The initial IHLW canister is filled on September 10, 2008. The BNFL Inc in-plant storage reaches 50 percent of capacity on April 2, 2009. Case 3S6E R2A predicts that BNFL Inc. will run out of in-plant storage on September 13, 2009, if IHLW is not shipped to the CSB. The maximum production rate of IHLW canisters in Phase 1 is 121 canisters/year. The peak annual production rate in Phase 2 is 861 canisters/year. The final IHLW canister is shipped in May 2032.

**Case 3S6E R2A Spec. 1 Evaluation of a Reduced HLW Waste Oxide Loading**

The HLW oxide loading limits estimated by the Glass Properties Model are replaced by the minimum limits stated in Specification 1 of the contract.

The number of IHLW canisters is significantly increased due to the low waste loading in Specification 1 of the contract. The Phase 2 LAW vitrification facility is significantly underutilized due to a process rate imbalance between the HLW and LAW vitrification plants. Product receipt schedules are provided in Appendix G.

Figure 6.2-7. Case 3S6E Total Phase 1 and Phase 2 Mission.
Decay Heat Characteristics of Immobilized High-Level Waste Canisters.

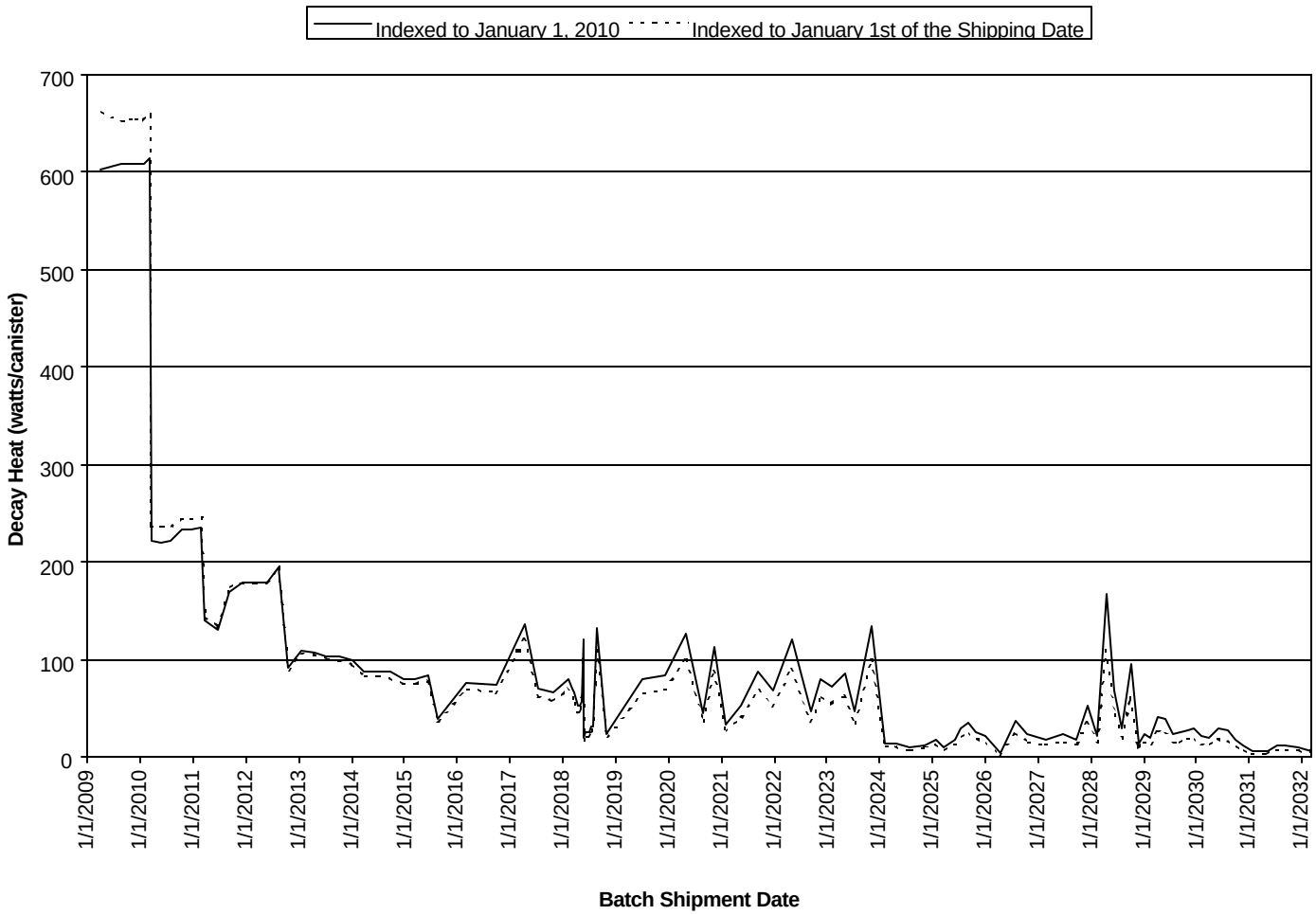


Figure 6.2-8. Case 3S6E Total Phase 1 and Phase 2 Mission.
Radiolytic Heat Load from Immobilized High-Level Waste Canisters in Storage Versus Time--Indexed to January 1, 2010.

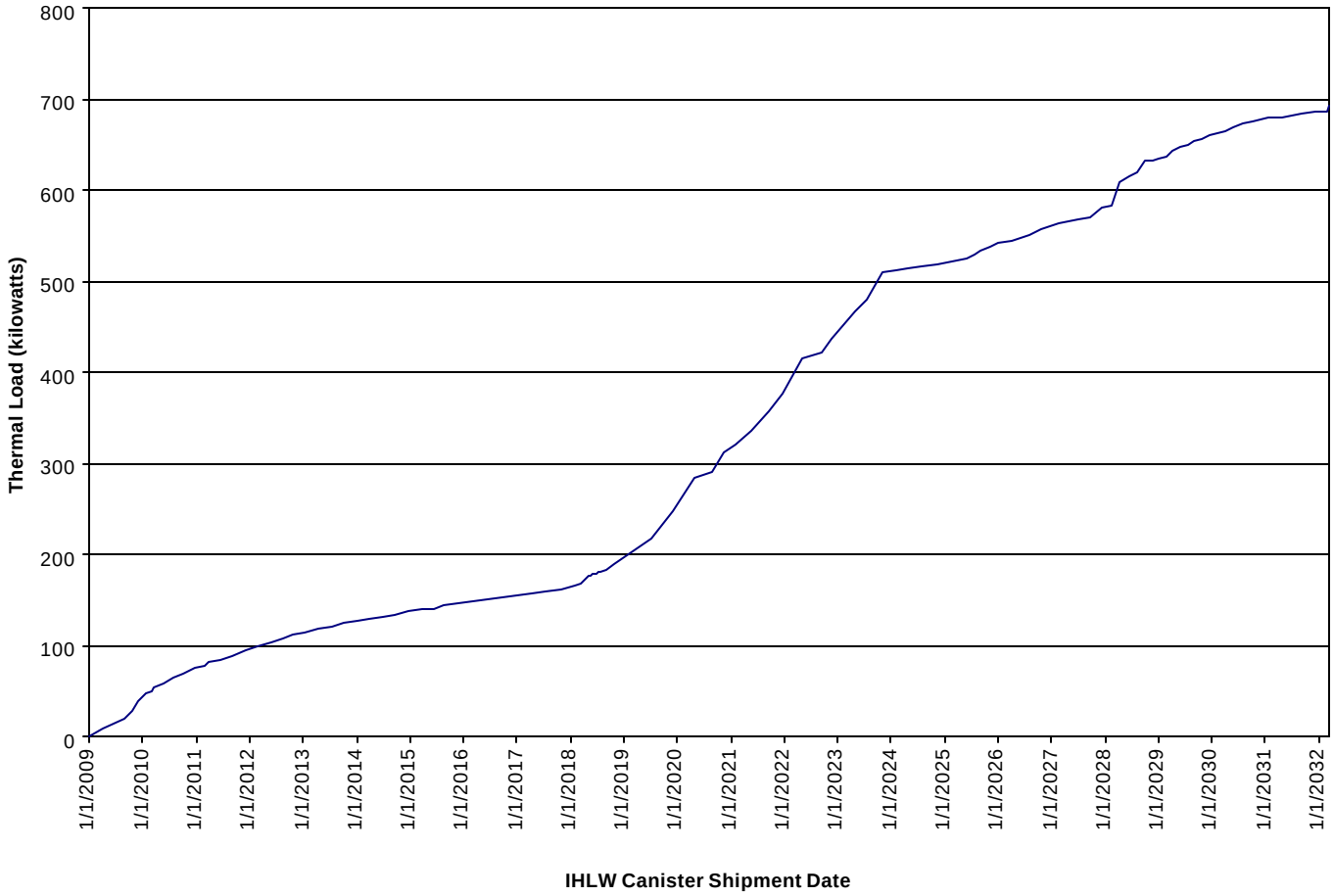
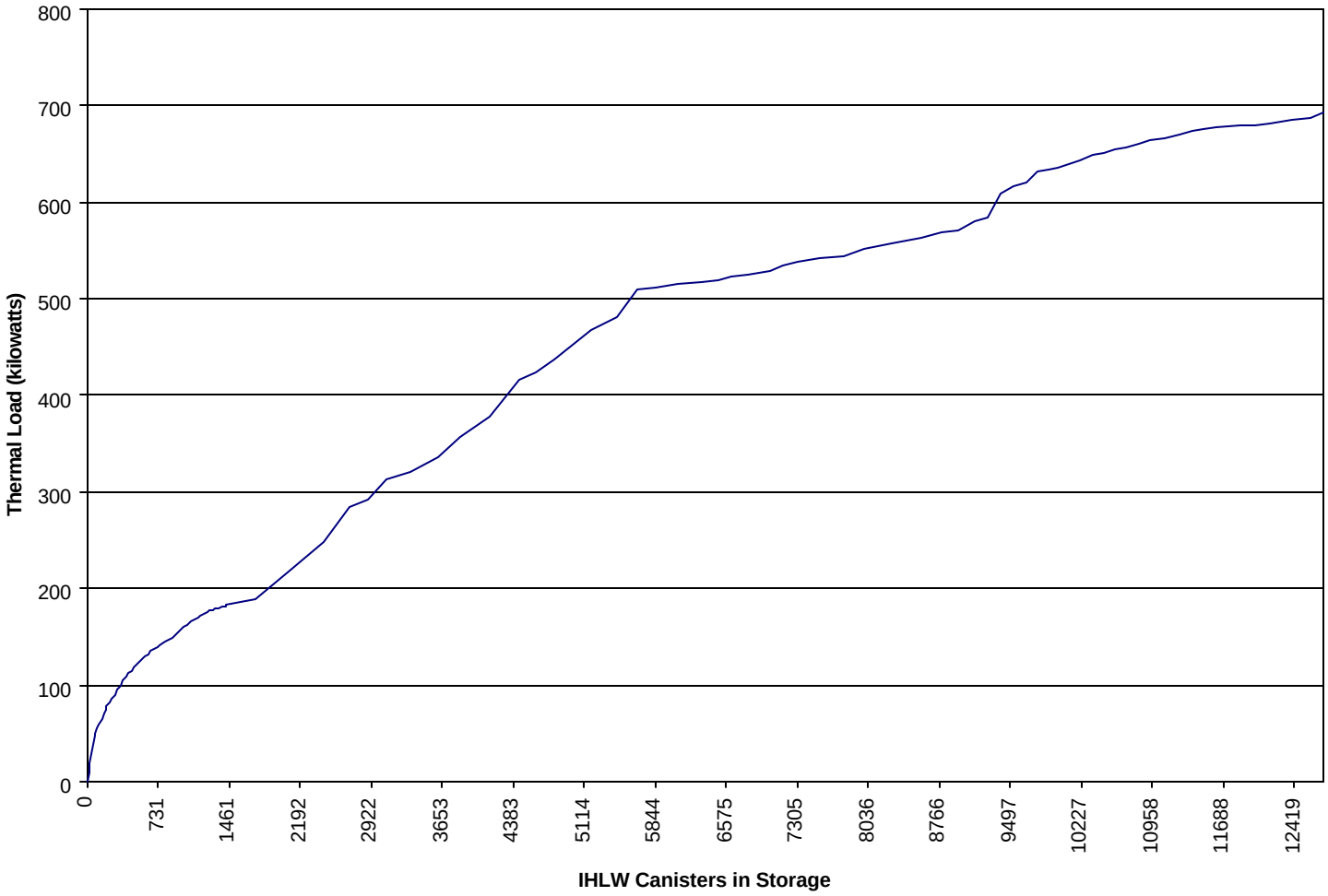


Figure 6.2-9. Case 3S6E Total Phase 1 and Phase 2 Mission.
Radiolytic Heat Load from Immobilized High-Level Canisters in Storage Versus Canisters Received--
Indexed to January 1, 2010.



Case 3S6E R2A Spec. 1 predicts the generation of approximately 64,100 ILAW packages. However, only 13,500 ILAW packages are filled by the end of the Phase 1 contract period. The initial ILAW package is filled on December 1, 2006. The BNFL Inc. in-plant storage reaches 50 percent of capacity on August 13, 2007. Case 3S6E R2A Specification 1 predicts that BNFL Inc. will run out of in-plant storage on January 18, 2008, if ILAW is not shipped to the ILAW Disposal Site. The maximum production rate of ILAW packages in Phase 1 is 1,270 packages/year. The peak annual production rate in Phase 2 is 4,380 packages/year. The Phase 2 LAW vitrification facility is significantly underutilized. The final ILAW package is shipped in March 2036.

Case 3S6E R2A Spec. 1 predicts the generation of approximately 17,500 IHLW canisters. However, only 1,070 IHLW canisters are filled by the end of the Phase 1 contract period. The initial IHLW canister is filled on September 10, 2008. The BNFL Inc in-plant storage reaches 50 percent of capacity on April 2, 2009. Case 3S6E R2A Specification 1 predicts that BNFL Inc. will run out of in-plant storage on September 13, 2009, if IHLW is not shipped to the CSB. The maximum production rate of IHLW canisters in Phase 1 is 121 canisters/year. The peak annual production rate in Phase 2 is 865 canisters/year. The final IHLW canister is shipped in June 2037.

**Case 3S6E R2.1 Evaluation of Increasing the Phase 2 HLW Vitrification Plant to 14 MT/day.**

The maximum Phase 2 vitrification rates are set at 120 MT/d glass for LAW and 14 MT/d glass for HLW. All other conditions are the same as Case 3S6E R2A.

Few of the ILAW vitrification production outages apparent in Phase 2 Case 3S6D R2A remain, indicating that the 120/14 ratio is near optimum. Product receipt schedules are provided in Appendix G.

Case 3S6E R2.1 predicts the generation of approximately 64,300 ILAW packages. However, only 13,500 ILAW packages are filled by the end of the Phase 1 contract period. The initial ILAW package is filled on December 1, 2006. The BNFL Inc. in-plant storage reaches 50 percent of capacity on August 13, 2007. Case 3S6E R2.1 predicts that BNFL Inc. will run out of in-plant storage on January 18, 2008 if ILAW is not shipped to the ILAW Disposal Site. The maximum production rate of ILAW packages in Phase 1 is 1,270 packages/year. The peak annual production rate in Phase 2 is 4,380 packages/year. The final ILAW package is shipped in May 2030.

Case 3S6E R2.1 predicts the generation of approximately 12,700 IHLW canisters. However, only 1,070 IHLW canisters are filled by the end of the Phase 1 contract period. The initial IHLW canister is filled on September 10, 2008. The BNFL Inc in-plant storage reaches 50 percent of capacity on April 2, 2009. Case 3S6E R2.1 predicts that BNFL Inc. will run out of in-plant storage on September 13, 2009, if IHLW is not shipped to the CSB. The maximum production rate of IHLW canisters in Phase 1 is 121 canisters/year. The peak annual production rate in Phase 2 is 1,004 canisters/year. The final IHLW canister is shipped in November 2030.

**Case 3S6D R7 Evaluation of the Basis for RTP-2, (2006 Hot Start)**

Sulfate is assumed to be removed from Phase 1 LAW feed. The Envelope B waste loading is increased to 19.5 wt% $Na_2O$. A LAW vitrification ramp-up of 141, 452, and 754 units of Na/yr is assumed.

The number of ILAW packages made is 900 less than in Case 3S6E R2A PIO Guidance. The number of IHLW canisters made is 100 less than in Case 3S6E R2A PIO Guidance.

Case 3S6D R7 is essentially the same as Case 3S6E R2A except 3S6D R7 assumes that sulfate is removed from Envelope B LAW feed and that vitrification process rates were revised for Case 3S6E R2A. Case 3S6D R7 predicts the generation of approximately 63,200 ILAW packages and 12,600 IHLW canisters. The schedule predictions of Case 3S6D R7 are not meaningful due to the differences in the process rate assumptions used in Cases 3S6D R7 and 3S6E R2A PIO Guidance.

**Case 3S6B R1 Evaluation of BNFL Inc. Plans for 2006 Hot Start (90% Trend)**

BNFL Inc. will fill the IHLW in-plant storage space in June 2009, three months prior to the assumed initial shipping date of September 2009. Significantly fewer ILAW packages are made in Phase 1 relative to Case 3S6E R2A PIO Guidance. Product receipt schedules are provided in Appendix G.

Case 3S6B R1 predicts the generation approximately 66,800 ILAW packages. However, only 7,900 ILAW packages are filled by the end of the Phase 1 contract period. BNFL Inc makes the initial ILAW package is filled on January 1, 2008. The BNFL Inc in-plant storage reaches 50 percent of capacity on November 10, 2008. Case 3S6B R1 predicts that BNFL Inc. will run out of in-plant storage on May 11, 2009, if ILAW is not shipped to the ILAW Disposal Site. The maximum production rate of ILAW packages in Phase 1 is 871 packages/year. The peak annual production rate in Phase 2 is 4,391 packages/year. The final ILAW package is shipped in May 2033.

Case 3S6B R1 predicts the generation of approximately 12,500 IHLW canisters. However, only 990 IHLW canisters are filled by the end of the Phase 1 contract period. The initial IHLW canister is filled on April 18, 2008. The BNFL Inc in-plant storage reaches 50 percent of capacity on April 14, 2009. Case 3S6B R1 predicts that BNFL Inc. will run out of in-plant storage on June 28, 2009, if IHLW is not shipped to the CSB. The maximum production rate of IHLW canisters in Phase 1 is 121 canisters/year. The peak annual production rate in Phase 2 is 861 canisters/year. The final IHLW canister is shipped in February 2034.

**Case 3S6B R2 Evaluation of the Phase 1 Minimum Contracted LAW Loading**

The ILAW glass formulation limits from the BNFL Inc. flowsheet are replaced by the minimum limits proposed for Specification 2 of the contract.

A significant increase in the Phase 1 vitrification rate is needed to meet the minimum contract order. The number of ILAW packages made is significantly increased. BNFL Inc. will fill the IHLW in-plant storage space in June 2009, three months prior to the assumed initial shipping date of September 2009 (PIO 2000). Product receipt schedules are provided in Appendix G

Case 3S6B R2 predicts the generation of approximately 73,500 ILAW packages. However, only 11,000 ILAW packages are filled by the end of the Phase 1 contract period. The initial ILAW package is filled on January 1, 2008. The BNFL Inc in-plant storage reaches 50 percent of capacity on August 13, 2008. Case 3S6B R2 predicts that BNFL Inc. will run out of in-plant storage on February 11, 2009, if ILAW is not shipped to the ILAW Disposal Site. The maximum production rate of ILAW packages in Phase 1 is 1,216 packages/year. The peak annual production rate in Phase 2 is 4,380 packages/year. The final ILAW package is shipped in April 2034.

Case 3S6B R2 predicts the generation of approximately 12,600 IHLW canisters. However, only 990 IHLW canisters are filled by the end of the Phase 1 contract period. The initial IHLW canister is filled on April 18, 2008. The BNFL Inc in-plant storage reaches 50 percent of capacity on April 14, 2009. Case 3S6B R2 predicts that BNFL Inc. will run out of in-plant storage on June 28, 2009, if IHLW is not shipped to the CSB. The maximum production rate of IHLW canisters in Phase 1 is 121 canisters/year. The peak annual production rate in Phase 2 is 861 canisters/year. The HLW vitrification facility is significantly underutilized in this scenario. The final IHLW canister is shipped in December 2034.

**Case 3S6B R3 Evaluation of a Reduced Phase 2 LAW Waste Loading**

The Phase 2 ILAW glass formulation is limited to [wt% Na2O][wt% SO3] < 5.

BNFL Inc. will fill the IHLW in-plant storage space in June 2009, three months prior to the assumed initial shipping date of September 2009 (PIO 2000). The number of ILAW packages made in Phase 2 increases significantly. Product receipt schedules are provided in Appendix G.

Case 3S6B R3 predicts the generation of approximately 99,000 ILAW packages. However, only 7,900 ILAW packages are filled by the end of the Phase 1 contract period. The initial ILAW package is filled on January 1, 2008. The BNFL Inc. in-plant storage reaches 50 percent of capacity on November 10, 2008. Case 3S6B R3 predicts that BNFL Inc. will run out of in-plant storage on May 11, 2009, if ILAW is not shipped to the ILAW Disposal Site. The maximum production rate of ILAW packages in Phase 1 is 871 packages/year. The peak annual production rate in Phase 2 is 4,395 packages/year. The final ILAW package is shipped in June 2039.

Case 3S6B R3 predicts the generation of approximately 12,400 IHLW canisters. However, only 990 IHLW canisters are filled by the end of the Phase 1 contract period. The initial IHLW canister is filled on April 18, 2008. The BNFL Inc in-plant storage reaches 50 percent of capacity on April 14, 2009. Case 3S6B R3 sulfate predicts that BNFL Inc. will run out of in-plant storage on June 11, 2009, if IHLW is not shipped to the CSB. The maximum production rate of IHLW canisters in Phase 1 is 121 canisters/year. The peak annual production rate in Phase 2 is 856 canisters/year. The HLW vitrification facility is significantly underutilized in this scenario. The final IHLW canister is shipped in December 2039.

**Case 3S6A Evaluation of BNFL Inc. Plans for an Early (2005) Hot Start (50% Trend)**

BNFL Inc. will fill the ILAW and IHLW in-plant storage space in December 2006 and June 2008 respectively. The dates are twelve and fifteen months prior to the assumed initial shipping dates of December 2007 and September 2009 (PIO 2000). Product receipt schedules are provided in Appendix G.

Case 3S6A predicts the generation of approximately 67,000 ILAW packages. However only 10,700 ILAW packages are filled by the end of the Phase 1 contract period. The initial ILAW package is filled on August 1, 2005. The BNFL Inc in-plant storage reaches 50 percent of capacity on June 11, 2006. Case 3S6A predicts that BNFL Inc. will run out of in-plant storage on December 10, 2006, if ILAW is not shipped to the ILAW Disposal Site. The maximum

production rate of ILAW packages in Phase 1 is 871 packages/year. The peak annual production rate in Phase 2 is 4,380 packages/year. The final ILAW package is shipped in October 2032.

Case 3S6A predicts the generation of approximately 12,900 IHLW canisters. However, only 1,500 IHLW canisters are filled by the end of the Phase 1 contract period. The initial IHLW canister is filled on April 18, 2007. The BNFL Inc. in-plant storage reaches 50 percent of capacity on April 13, 2008. Case 3S6B predicts that BNFL Inc. will run out of in-plant storage on June 27, 2008, if IHLW is not shipped to the CSB. The maximum production rate of IHLW canisters in Phase 1 is 121 canisters/year. The peak annual production rate in Phase 2 is 862 canisters/year. The final IHLW canister is shipped in July 2033.

**Case 3S6C Evaluation of WFD Plans for an Early (2005) Hot Start (50% Trend)**

BNFL Inc. will fill the ILAW and IHLW in-plant storage space in December 2006 and June 2008 respectively. These dates are twelve and fifteen months prior to the assumed initial shipping dates of December 2007 and September 2009 (PIO 2000). Product receipt schedules are provided in Appendix G.

Case 3S6C predicts the generation of approximately 64,100 ILAW packages. However, only 14,400 ILAW packages are filled by the end of the Phase 1 contract period. The initial ILAW package is filled on August 1, 2005. The BNFL Inc. in-plant storage reaches 50 percent of capacity on June 11, 2006. Case 3S6C predicts that BNFL Inc. will run out of in-plant storage on December 10, 2006, if ILAW is not shipped to the ILAW Disposal Site. The maximum production rate of ILAW packages in Phase 1 is 1,274 packages/year. The peak annual production rate in Phase 2 is 4,380 packages/year. The final ILAW package is shipped in November 2031.

Case 3S6C predicts the generation of approximately 12,500 IHLW canisters. However, only 1,420 IHLW canisters are filled by the end of the Phase 1 contract period. The initial IHLW canister is filled on April 18, 2007. The BNFL Inc. in-plant storage reaches 50 percent of capacity on April 13, 2008. Case 3S6B predicts that BNFL Inc. will run out of in-plant storage on June 27, 2008, if IHLW is not shipped to the CSB. The maximum production rate of IHLW canisters in Phase 1 is 121 canisters/year. The peak annual production rate in Phase 2 is 861 canisters/year. The final IHLW canister is shipped in April 2032.